

SEVERE LOCAL STORMS, JUNE 1941—Continued

Place	Date	Time	Width of path yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Belleville, Kans.	8	5 p. m.		0	\$5,000	Tornado	Property damaged, path narrow and short.
Wellington and Belle Plain, Kans., and vicinities.	8	5:30 p. m.	440	0	10,000	do.	Damage to rural property and crops, path 12 miles long.
Quinter, Kans.	8	5:30-6:30 p. m.		0	50,000	do.	Farm buildings damaged and several persons injured, path narrow and 50 miles long.
Tatum, N. Mex.	8	7 p. m.			1,000	Hail	Loss in crops.
Sedgwick, Butler, and Marion Counties, Kans.	8	10:30-11:30 p. m.	880	8	180,000	Tornado	Property damaged in rural districts, about 20 persons injured, \$30,000 loss in crops, path 42 miles long.
Littlefield, Tex., vicinity of.	9	4 a. m.	100	2	3,500	do.	Property damaged, 11 persons injured.
Kress, Tex., and vicinity	9	4:15-4:30 a. m.	100	1	6,500	do.	Property damaged, 12 persons injured.
Clarendon, Tex.	9	5 a. m.	67	1	500,000	do.	Amount estimate of property damage, crop loss unknown.
Hallsville, Tex.	10	2:10 p. m.	880	0	3,000	do.	Property damaged.
Mooringsport, La.	10	2:14 p. m.	100	0	80,000	do.	Storm originated near Hallsville, Tex., moved east-northeastward crossing Louisiana State line in the vicinity Mooringsport, moving northeastward to the vicinity of Belcher; 2 persons were injured; property damage \$70,000; loss to crops, \$10,000; length of path 60 to 70 miles.
Pearsall, Tex.	11	7:30 p. m.	12	0	6,000	do.	Property damaged.
Abilene, Tex.	13	5:32-5:45 p. m.	1-2		40,000	Hail	Only property damage estimated; considerable loss in wheat, oats, barley, and cotton not estimated.
Kaufman, Tex.	13		12		27,000	do.	\$25,000 loss in cotton, corn, and other grain; \$2,000 property damage.
Raton, N. Mex., vicinity of.	14	3-4:30 p. m.	880		2,500	Heavy hail	Loss in crops.
Bellview, N. Mex., 10 miles west.	14	5 p. m.	12		10,000	do.	Do.
Post, Tex.	15	2:30 p. m.	13		25,000	Hail	Loss in cotton, corn, and wheat.
Clayton, N. Mex.	16	3:10-3:34 p. m.	11		1,000	Heavy hail	Property damaged.
Grenville, N. Mex.	16	P. m.	15		4,000	do.	Loss in crops.
Grenville, N. Mex.	18	2:15-3:30 p. m.	12		2,800	do.	\$300 loss in crops, \$2,500 damage to roofs.
Prairie County, Mont.	19	5 p. m.	11		10,000	do.	Loss in wheat and alfalfa, path 36 miles long.
Dawson, Richland, and Roosevelt Counties, Mont.	19	5-7 p. m.	14		20,000	Hail and wind	Loss in wheat, oats, small grain, and gardens; property damaged; path 50 miles long.
Glacier Park and Browning, Mont.	24	5-6:15 p. m.	13		10,000	do.	Property damaged, slight crop loss, path 50 miles long.
Richland County, Mont.	27	2-11 p. m.	120		280,000	Wind, hail, and rain.	3 or 4 separate storms covered the entire county during this period; large number of baby chicks and turkeys and some lambs killed with \$250,000 loss; property damage, \$30,000; path 60 miles long.
Kaufman, Tex.	27	3:30-5 p. m.	12	0	10,000	Tornado	Property damage, \$10,000; much loss in corn not estimated.
Carbon, Big Horn and Yellowstone Counties, Mont.	28	2-5:30 p. m.	12		35,000	Hail	Beans, sugar beets, wheat, and gardens damaged.
El Paso, Tex., 5 miles west.	28				1,100	Hail and wind	Property damaged.
Fergus and Petroleum Counties, Mont.	28		13		50,400	Hail	Loss chiefly in grain and alfalfa, some windows broken, path 25 miles long.
Britton, S. Dak., vicinity of.	29	8:30 p. m.		0		Tornado	Farm buildings and a school damaged over a path several miles long.
Formosa, Kans.	30	1-1:30 a. m.	15		150,000	Hail	Total loss of all unharvested grain, path 12 miles long.
Burdett, Kans.	30	P. m.	11		8,000	Heavy hail	Loss in wheat, path 5 miles long.

¹ Miles instead of yards.

SOLAR RADIATION AND SUNSPOT DATA FOR JUNE 1941

SOLAR RADIATION OBSERVATIONS

BY HELEN CULLINANE

Measurements of solar radiant energy received at the surface of the earth are made at 9 stations maintained by the Weather Bureau and at 12 cooperating stations maintained by other institutions. The intensity of the total radiation from sun and sky on a horizontal surface is continuously recorded (from sunrise to sunset) at all these stations by self-registering instruments; pyrheliometric measurements of the intensity of direct solar radiation at normal incidence are made at frequent intervals on clear days at three Weather Bureau stations (Madison, Wis.; Lincoln, Nebr.; and Albuquerque, N. Mex.) and at the Blue Hill Observatory at Harvard University. Occasional observations of sky polarization are taken at the Weather Bureau station at Madison and at Blue Hill Observatory.

The geographic coordinates of the stations, descriptions of the instrumental equipment, station exposures, and methods of observation, together with summaries of the data obtained, up to the end of 1939, are given in the MONTHLY WEATHER REVIEW for December 1937 and April 1941.

Table 1 contains the measurements of the intensity of direct solar radiation at normal incidence, with means and their departures from normal (means based on less than 3 values are in parentheses). At Lincoln, Madison,

Albuquerque, and Blue Hill the observations are obtained with a recording thermopile, checked by observations with a Smithsonian silver-disk pyrheliometer at Blue Hill. The table also gives vapor pressures at 7:30 a. m. and at 1:30 p. m. (75th meridian time).

Table 2 contains the average amounts of radiation received daily on a horizontal surface from both sun and sky during each week, their departures from normal and the accumulated departures since the beginning of the year. The values at most of the stations are obtained from the records of the Eppley pyrheliometer recording on either a microammeter or a potentiometer.

Total solar and sky radiation during June was excessive at all stations except Lincoln, Madison, La Jolla, Friday Harbor, and Newport, where it was just barely below normal.

Radiation at normal incidence was below normal at all stations. Some measurements were made at Blue Hill during some severe forest fires, thus showing the effect of yellow smoke on radiation received.

The recalibration of pyrheliometers at three more stations—Lincoln, Madison, and New York—was completed during the month, and corrected data for the period, January–May, will be found in this issue.

Polarization observations made at Madison on 9 days gave a mean of 49 percent—10 percent below normal—with a maximum of 60, 6 percent below the normal maximum for the month.

CORRECTIONS TO TABLE 2

Week beginning—	Lincoln		Madison		New York	
	Amount received	Departure from mean	Amount received	Departure from mean	Amount received	Departure from mean
Jan. 1.	cal. 130	cal. -41	cal. 116	cal. -11	cal. 146	cal. +38
Jan. 8.	161	-18	116	-14	157	+49
Jan. 15.	112	-78	108	-44	105	-9
Jan. 22.	137	-88	138	-45	120	-30
Jan. 29.	180	-36	244	+58	177	+22
Feb. 5.	271	+16	221	+18	201	+33
Feb. 12.	217	-44	205	-18	176	0
Feb. 19.	214	-73	347	+91	302	+98
Feb. 26.	263	-46	257	-12	288	+44
Mar. 5.	257	-66	227	-74	233	-20
Mar. 12.	383	+22	447	+125	322	+57
Mar. 19.	302	-78	387	+50	420	+104
Mar. 26.	367	-5	342	-14	414	+127
Apr. 2.	96	-293	324	-44	447	+114
Apr. 9.	325	-105	393	-8	495	+158
Apr. 16.	428	-14	341	-56	573	+210
Apr. 23.	537	+105	554	+116	541	+121
Apr. 30.	427	-41	490	+43	518	+105
May 7.	525	+73	549	+95	445	+41
May 14.	536	+25	547	+98	513	+86
May 21.	576	+31	589	+91	536	+100
May 28.	476	-43	393	-102	438	-27

TABLE 1.—Solar radiation intensities during June 1941

[Gram-calories per minute per square centimeter of normal surface]

Albuquerque, N. Mex.

Date	Sun's zenith distance											Local mean solar time
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.	
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	
June 1	<i>mm.</i> 5.6	<i>cal.</i> 0.86	<i>cal.</i> 0.94	<i>cal.</i> 1.05	<i>cal.</i> 1.21	<i>cal.</i> 1.47	<i>cal.</i> 1.38	<i>cal.</i> 1.01	<i>cal.</i> 0.89	<i>cal.</i> 0.81	<i>mm.</i> 4.8	
June 2	6.8	.85		.07	1.19		1.38				7.3	
June 3	8.8	.83	.87	1.00	1.18						9.8	
June 4	8.5				1.25	1.46					7.3	
June 5	9.1			1.00	1.15	1.46					5.2	
June 6	6.5					1.45	1.32	1.17		0.96	4.2	
June 7	6.5	.84		1.06					.98		5.2	
June 8	5.0					1.50	1.28	1.13	1.00	.95	6.3	
June 9	7.9	.93	1.1	1.12	1.29	1.50	1.27				4.4	
June 10	8.5			.95	1.12						8.5	
June 11	8.5	.78	.86	.99	1.18	1.40					6.5	
June 12	8.5	.78	.87	.97	1.14	1.40	1.18	1.01			7.6	
June 13	6.5				1.15	1.46	1.16	.99	.83	.72	5.0	
June 14	7.0		.87		1.15	1.46	1.17				4.4	
June 15	6.3				1.22	1.41	1.16				6.5	
June 16	10.2					1.39					9.5	
June 17	10.6			.97	1.15						10.2	
June 18	8.5					1.43	1.15				8.5	
June 19	6.5	.88	.97	1.13	1.27	1.48	1.30	1.15	1.08	.99	5.0	
June 20	2.9	.99	1.12	1.21	1.35	1.50	1.31	1.11	1.00	.94	3.2	
June 21	4.6			1.18	1.30						4.2	
Means		.86	.94	1.05	1.21	1.45	1.24	1.08	.97	.91		

*Extrapolated.

TABLE 1.—Solar radiation intensities during June 1941—Con.

[Gram-calories per minute per square centimeter of normal surface]

Blue Hill Observatory

Date	Sun's zenith distance										1:30 p. m.		
	7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°			
	75th mer. time	Air mass										Local mean solar time	
		A. M.					P. M.						
		e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0			5.0
June 2	mm. 9.9						cal. 0.92	0.70	0.51	0.39	mm. 10.3		
June 3	9.6	0.35	0.45	0.58	0.81						8.8		
June 6	.8						1.88	1.47	1.20		6.5		
June 7	8.2	1.20	1.28	1.36	1.52		1.47	1.39	1.26		9.9		
June 9	6.1		.91	1.06	1.23	1.47	1.22	1.08	.95	.84	5.0		
June 10	4.4	.89	.99	1.10	1.28	1.45					5.0		
June 11	5.8	.84	.95	1.06	1.22						6.5		
June 17	13.7				.85						13.7		
June 18	12.3	.43	.53	.66							13.2		
June 19	13.2	.66	.76	.89	1.01	1.19					12.8		
June 20	13.2	.42	.52	.67	.85						15.8		
June 21	14.3					1.19		.58	.45	.35	16.4		
June 22	15.3				.67	.91					14.3		
June 27	14.3				.51	.67					11.9		
June 28	18.2	.69	.75	.86	.95	1.29					16.9		
Means		.56	.68	.76	.94	1.32	.87	.64	.47	.53			
Departures		-.11	-.11	-.18	-.12	+.02	-.19	-.27	-.21	-.01			

Lincoln, Nebr.

June 16.	9.8					0.75					9.8
June 19.	12.2					.92	0.73	0.58	0.45		14.6
June 26.	16.8						.80	.71	.58		19.2
Means.						(.84)	(.76)	(.64)	(.52)		
Departures.						-.26	-.15	-.14	-.14		

Madison, Wis.

June 4.	9.1	0.49	0.59	0.73	0.90	1.33					7.9
June 5.	12.2	.52	.66	.84	.98	1.22					11.0
June 6.	7.6			.73	.88	1.28					6.3
June 7.	9.8	.44	.58	.71	.92	1.16					11.4
June 8.	12.2	.50	.61	.66	.91	1.22					12.2
June 9.	12.7	.44	.54	.69	.92	1.26					11.4
June 10.	12.7	.54									12.2
June 11.	14.1	.53	.66	.81	1.04	1.30					15.6
June 12.	12.9	.50	.64	.81	1.08	1.33					14.1
June 13.	17.4	.50	.60	.74	1.02	1.18					21.3
Means.		.50	.61	.75	.96	1.25					
Departures.		-.17	-.21	-.20	-.09	-.08					

1 Readings taken during forest fire.

TABLE 2.—Average daily totals of solar radiation (direct + diffuse) received on a horizontal surface

[Gram-calories per square centimeter]

Week beginning—	Washington	Madison	Lincoln	Chicago	New York	Fresno	Cambridge	Fairbanks	La Jolla	Newport	New Orleans	Albuquerque	Friday Harbor
June 4.	cal. 491	cal. 410	cal. 405	cal. 502	cal. 482	cal. 723	cal. 504	cal. 599	cal. 449	cal. 522	cal. 529	cal. 650	cal. 558
June 11.	413	388	421	414	409	707	329	523	465	415	398	673	518
June 18.	543	643	679	679	579	760	550	499	666	610	499	637	536
June 25.	597	527	599	582	525	689	601	471	572	570	515	746	660

DEPARTURES FROM WEEKLY NORMALS

June 4.	-19	-103	-130	+26	+34	+57	+59	+110	-87	-29	+64	-8	-57
June 11.	-87	-119	-109	-49	-37	+17	-99	+19	-73	-73	-62	+17	-32
June 18.	+49	+108	+104	+178	+131	+48	+44	-13	+71	+33	+35	-36	-60
June 25.	+67	-9	+7	+94	+81	-7	+28	+7	+18	+18	+69	+39	+49

ACCUMULATED DEPARTURES ON JULY 1, 1941

+3, 136	+1, 393	-6, 475	+7, 903	+11, 410	+2, 632	+112	+1, 470	-2, 373	-378	+4, 452		+3, 192
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